NOTES, ABSTRACTS, AND REVIEWS.

Austin Lee McRae, 1861–1922.

We regret to announce the death of Prof. A. L. McRae, which occurred at Rolla, Mo., March 18, 1922, at the age of 60 years.

Professor McRae will be remembered by the older members of the Weather Bureau as a colleague of McAdie, Morrill, and Schultz in the early eighties in investigations upon atmospheric electricity. While stationed at Boston he studied under Prof. John Trowbridge, of Harvard University, and received the degree S. D. from that institution in 1886. In addition to service at Boston, he was on duty at Columbus, Ohio, Terre Haute, Ind., Rapid City, S. Dak., and Columbia, Mo. At the last-named station he perfected arrangements whereby the State Weather Service of Missouri, organized in 1877 by Prof. F. E. Nipher, of Washington University, and supported by private means, was taken over by the National Weather Service in cooperation with the State Board of Agriculture of Missouri. Professor McRae was the first director under the reorganization. He resigned from the Signal Service in August, 1891, to engage in teaching in the University of Missouri; later he held the chair of professor of physics at the University of Missouri, School of Mines, at Rolla, Mo., 1891–1894. After a brief period of teaching in the University of Texas and three years as consulting engineer in St. Louis, Mo., he returned to the School of Mines at Rolla in 1899 as professor of physics and since 1915 as director. He is survived by a wife and three children.—*A. J. H.*

HEAVY RAINS AT PAGO PAGO HARBOR, TUTUILA, SAMOA.

In the January, 1922, REVIEW, page 26, the monthly amounts of precipitation at Pago Pago Harbor were presented. We have now received through Dr. Alfred G. Mayor, Director Department of Marine Biology of the Carnegie Institution of Washington, additional details as to the frequency and distribution of precipitation of 2 inches and over in 24 hours at the same place. The observations were made at the United States naval station under the direction of Lieut. F. C. Nyland, United States Navy.

Tutuila is the southernmost of the Samoan group and its geographical coordinates are S. lat. 14° 18′; W. long. 170° 41′. The harbor of Pago Pago is a deep indentation on the south coast, which almost bisects the island. The harbor is encompassed by mountains; a sharp peak to the westward reaches an altitude of 2,133 feet above sea level; directly to the eastward another peak rises to an elevation of 1,719 feet.

The average annual precipitation of Pago Pago is 196 inches (21 years' record). The greatest annual amount in that time was 284.4 inches; the least 130.1; the greatest monthly amount was 60.5 inches, in May, 1913; the least, 0.1, in June, 1900. The greatest 24-hour amount was 20 inches, in May, 1912; other large daily amounts were 16.5 inches, in June, 1920, and November, 1908; 15.9 inches, in September, 1914.

These amounts compare very well with other large daily rains in the Tropics. Java, for example, has a record of 20.12 inches in 24 hours at Besokor, a plains station at an elevation of but 45 m. above sea level.

Greater amounts than those mentioned are occasionally recorded in temperate latitudes far removed from the ocean.

The winds of the Samoan group.—The southeast trades blow from the middle or end of April to November, diminishing in strength and steadiness during the last half of the winter. In July and August—winter months in the Southern Hemisphere—the southeast trades are fresh and at times squalls prevail. The two months named are the months of least average rainfall, although in some seasons heavy rains fall even then. The winds during the remainder of the year are, in general, easterly. At times, however, westerly winds and calms prevail.

In general, it would seem that the heavy precipitation of Tutuila as compared with Apia, on the north side of Upola, must be due to the topography of the first named and the fact that Pago Pago is practically an inland rather then a coast station.

In the table below will be found the total number of rains of 2 inches and over in 24 hours, arranged by months and groups or classes. The latter range from 2–4.5 inches at the lower end to 15–20 inches at the upper end. It will be seen that 80 per cent of the heavy rains fall within the first class and that 94 per cent of the total number of heavy rains fall within the first and second classes.

TABLE 1.—*Number of 24-hour rains of 2 inches and over (1900–1921) at Pago Pago Harbor, Tutuila, Samoa.*

Classes.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
													P.ct.
(1) 2–4.5 inches	45	60	56	45	30	37	16	21	33	42	47	53	80
(2) 4.6–7 inches	15	5	7	8	5	5	2	2	7	7	15	5	14
(3) 7.1–9.5 inches	3	4	2	2	0	3	1	....	1	1	3	1	3
(4) 9.6–12 inches	1	3	....	....	1	1	3	....	1	....	0	0	2
(5) 12–15 inches	....	1	....	....	1	0	....	....	0	....	0	1	.....
(6) 15–20 inches	....	....	....	....	....	1	....	....	1	....	1	....	.....
Total	64	73	65	55	37	47	22	23	43	50	66	60	.....

—*A. J. H.*

CRUISE OF THE "ARNAUER HANSEN."

We are indebted to the American consul at Bergen, Norway, for the information that the Bergen Geophysical Institute is equipping the *Arnauer Hansen*, a motor ship, for a meteorological research cruise in the Atlantic, the main object being to establish the practicability of issuing weather forecasts for the Atlantic.

The *Arnauer Hansen* is being fitted out at Bergen, and its cruise will be financed by the Norwegian Government and Bergen shipping interests. Professor Helland-Hansen, chief of the Bergen Geophysical Institute, and Chief Calwagen, of the Bergen Observatory, will accompany the expedition, which will set out from Ostend early in May.—*A. J. H.*

THE JAN MAYEN METEOROLOGICAL STATION.

Through the courtesy of the American consul at Bergen, Norway, we are able to announce that the meteorological station established on Jan Mayen in the autumn of 1921 will be taken over by the Norwegian Government on May 1, 1922. Jan Mayen is an isolated rock in the Arctic Ocean, nearly midway between North Cape and

Greenland. The meteorological station there was founded through the efforts of the Bergen Geophysical Institute by private subscription and some assistance from the Norwegian Government.—*A. J. H.*

BULLETIN OF THE CUBAN NATIONAL OBSERVATORY.

We are glad to note the enlargement of the Cuban National Observatory Bulletin published by the Department of Agriculture, Commerce, and Labor. This bulletin, which formerly carried a formal review of the weather and crops, now includes articles on various meteorological topics, as well as data of daily meteorological observations in considerable detail for the national observatory and monthly summaries of temperature and precipitation for 26 substations throughout the island.

The enlarged publication is a welcome addition to the literature on tropical meteorology.

METEOROLOGICAL SERVICE FOR COLOMBIA.

Meteorologists throughout the world will be glad to learn that the Republic of Colombia is organizing a national meteorological service, with headquarters at the observatory of Bogota. This service will be under the direction of the Rev. Simón Sarasola, S. J., founder and for 10 years director of the Observatorio del Colegio "Nuestra Señora de Montserrat," Cienfuegos, Cuba.

Very little meteorological or climatological work has heretofore been done in Colombia, even in comparison with the other regions of tropical Latin America, and the data to be collected by the new service will fill a serious gap in scientific literature. Moreover, a thorough climatological survey of Colombia will undoubtedly be of immense economic value to that country as an aid to the development of agriculture and the various industries. The Colombian Government is to be congratulated upon the important enterprise that it has undertaken, and it is greatly to be hoped that the other Latin-American Republics that now lack official meteorological organizations will follow Colombia's enlightened example.

FIRST AEROLOGICAL STATION IN BRAZIL.

We are indebted to Consul General Alphonse Gaulin, of Rio de Janeiro, Brazil, for the following:

According to an article which occurred in the Brazilian American of March 4, 1922, the Director of the Brazilian Meteorological Service has started the preliminary surveys for the construction of a kite station in the State of Rio Grande do Sul. * * * This appears to be the first step taken in regard to the proposed aerial lines between Rio de Janeiro and Porto Alegro.

WIND MEASUREMENTS IN THE LOWEST LAYERS.[1]

By ALBERT PEPPLER.

[Abstracted from *Beiträge zur Physik der freien Atmosphäre*, Band IX, Heft 3, pp. 114-129. 1921.]

The high radio towers at Nauen and Eilvese, Germany, afford exceptional opportunity, owing to their slender construction and consequent freedom from eddies and turbulence, for measuring the speed of the wind at various low levels in the atmosphere. Hellmann has investigated these conditions on the Nauen tower and the author now offers a discussion of the observations on the Eilvese towers, the highest of which is 250 meters.

The measurements were made at altitudes of 0, 2, 9.5, 16.5, 42, 82, and 124 meters above the ground. The anemometers were located on various towers of the radio station. This station is located in a level marshy region about 4 kilometers northeast of the Steinhuder Meer, and is therefore characteristic of the lowlands of northwest Germany.

The following phases of these observations are discussed:

(*1*) *The increase of wind speed with height.*—It is found that when the speed at 2 meters is plotted against the difference between the speed at the surface and at 2 meters the points fall on a parabolic curve. The formula of Hellman, $V_0 = V_2 (h/2)^{\frac{1}{2}}$ for calculating wind speeds between surface and 2 meters agrees well with the Eilvese observations, especially when the speed is between 3 and 5 m. p. s. at 2 meters. Above 2 meters, the rate of increase of wind speed falls off quite rapidly, until above 16.5 meters it is almost linear, increasing about 2 centimeters per second per meter increase of altitude. The mean decrease of rate is shown as follows in cm. p. s. per meter of height:

	0-2	2-9.5	9.5-16.5	16.5-42	42-82	82-124
Eilvese	116	12	6	2	2	2
Nauen	104	10		4	2	

(*2*) *Comparison of vertical wind gradients in the north German lowlands with the Flanders coast.*—These comparisons are possible through observations made during the war. The anemometer at Brügge was located on a tower at an effective height of 80 meters above the surface. At Ostend observatory—on the coast, 22 kilometers distant—the anemometer was located at a height of 30 meters above the surface. The difference in wind speed between the two stations is in accord with the Nauen and Eilvese observations.

(*3*) *Diurnal variation of wind speed.*—The discussion embraces both cyclonic and anticyclonic weather, and it is shown that in anticyclonic weather the maximum wind speed occurs about midday and minimum just after midnight. The 124-meter curve, however, has its maximum just before midnight and its minimum just before noon. The curve for 42 meters is intermediate, showing the least amplitude of diurnal variation. The cyclonic curves are more nearly parallel, and show in all levels a maximum wind speed just after midday and a minimum just before midnight. In comparing the vertical wind gradient in cyclones and anticyclones it is found that between 2 and 16 meters above the durface the rate of increase is greater in cyclones than in anticyclones, but above 16 meters there is no essential difference.—*C. L. M.*

[1] *Windmessungen auf dem Eilveser Funkenturm.*